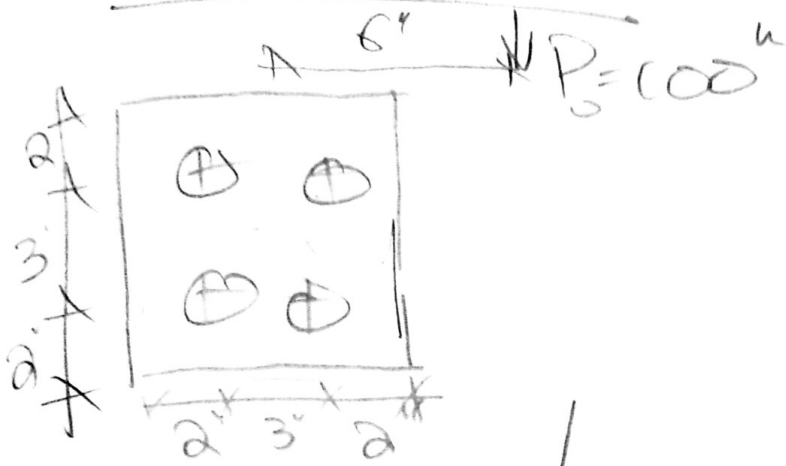
ECC BOLTS - 1



$V_{DIR} = 100^k / 4 = 24^k$

SOLVE V_{MOMENT}

$M = 100^k \times 6'' = 600\ k\text{-in}$

d FROM CG TO BOLT

$d = 1.5'' \times \sqrt{2}$

$d = 2.12''$

$\Sigma d^2 = 4 \times (2.12)^2$

$\Sigma d^2 = 18$

$\frac{M \times V}{\Sigma d^2}$

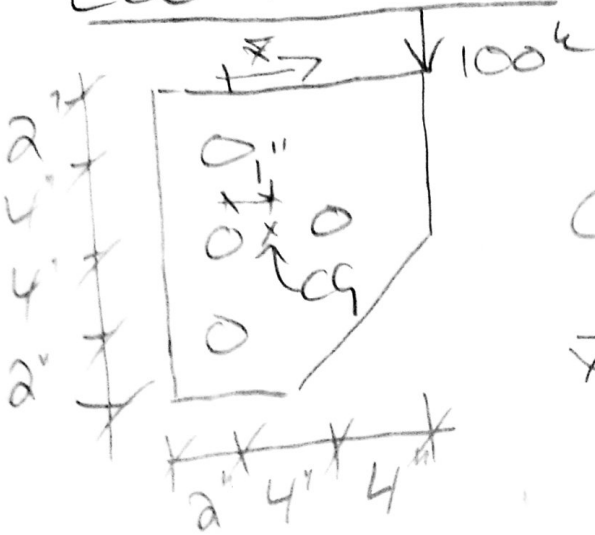
$V_{HORIZ} = 0 + \frac{60 \times 1.5''}{18} = 50^k$

$V_{VERT} = V_{DIR} + \frac{M \times h}{\Sigma d^2}$

$= 25^k + \frac{600 \times 1.5}{18} = 75^k$ OR -25^k

$V_{TOT} = \sqrt{50^2 + 75^2} = 90^{k/B}$

ECC BOLTS 2



CG: $\bar{y} = 6"$ BY INSPECTION

$\bar{x} \Rightarrow \frac{3 \times 0" + 1 \times 4"}{4} = 1"$

ECCENTRICITY: $100^k \times (4" + 4" - 1")$ CG

$= 700$ k-in

$V_{DIR} = 100^k/4 = 25^k$

T/B BOLT

$d = \sqrt{1^2 + 4^2}$

$= \sqrt{17}$

$\Sigma d^2 = 1^2 + 3^2 + (\sqrt{17})^2 + (\sqrt{17})^2$

$= 44$

$M \times r / \Sigma d^2$

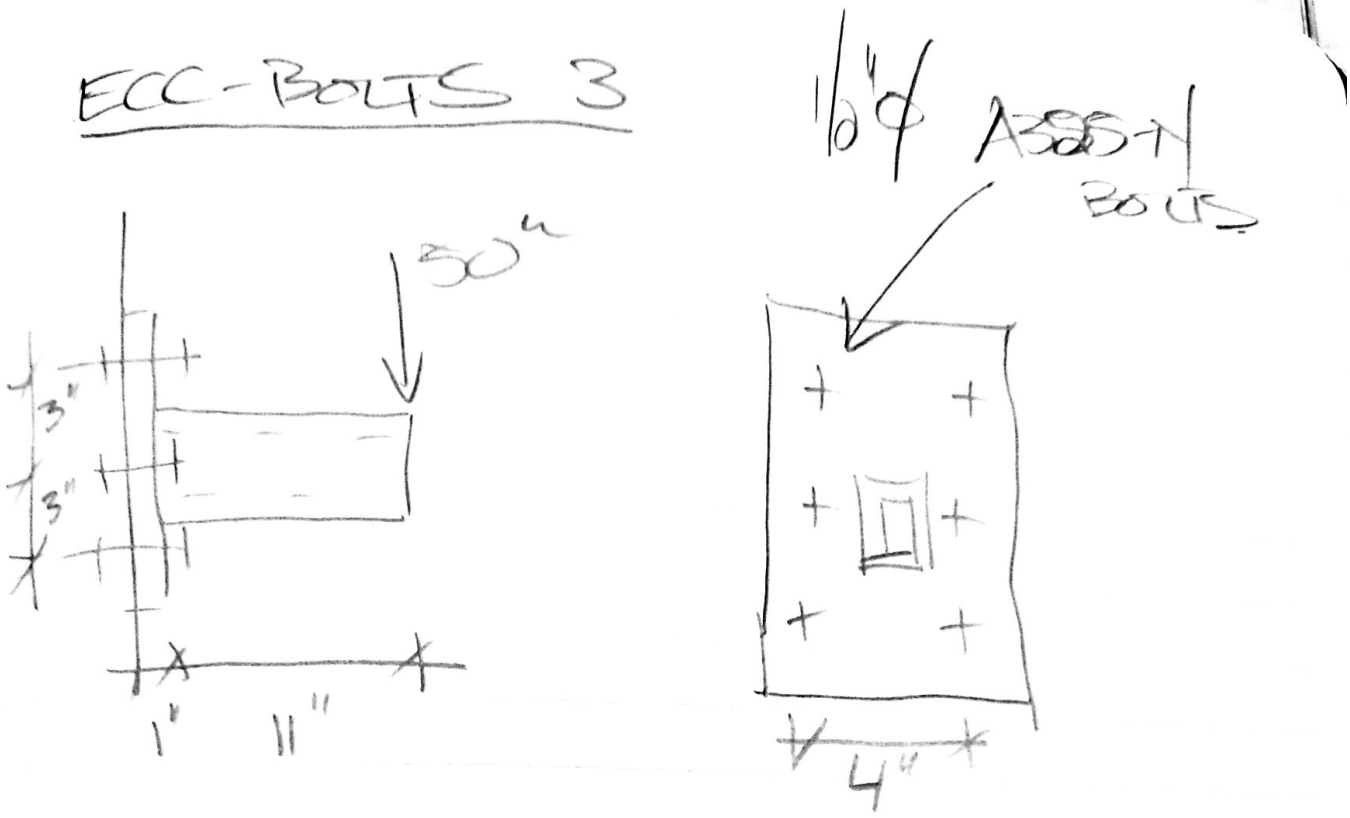
$V_{HORIZ\ TOP\ BOLT} = \frac{700 \times 4}{44} = 64^k$

$V_{VERT\ TOP\ BOLT} = 25^k + \frac{M \times h}{\Sigma d^2}$

$= 25 + \frac{700 \times 1}{44} = 41^k$

$V_{TOT} = \sqrt{64^2 + 41^2} = 76^k$

ECC-BOLTS 3



$M = 50^k \times 12'' = 600\ k\text{-in}$

$V_{DIR} = 50^k / 6 = 8.3^k$ SHEAR

$T/C = 600\ k\text{-in} / 6'' \times 2\ \text{BOLTS} = 50^k$ TEN

$$1.3F_{nt} - \frac{F_{nt}}{\phi F_{nv}} f_{rv} < F_{nt}$$

$$1.3 \times 90 - \frac{90}{0.75 \times 54} \times \left(\frac{8.3}{0.2}\right) = 24\ ksi$$

$24\ ksi \times 0.9 \times 0.207 = 4.47^k$ NG!